DESCRIPTION OF

MODBUS CONNECTION

komfovent

MODBUS CONNECTION

There is a possibility to control Air Handling Unit (AHU) from external management system (BMS), which work with MODBUS data processing. For MODBUS connection are three possibilities:

1. Connect direct to control panel connection place using RS-485 data transfer interface and read data with MODBUS RTU protocol.

   In this case unit operation with control panel impossible, because panel must to be disconnected!

2. For operation with control panel should to be installed NET module additionally. In this case MODBUS RTU data reading is possible from NET module RS-232 interface.
3. The same connection as explained in section 2 but data reading is provided with MODBUS TCP from NET module TCP/IP interface.

MODBUS connection description is detailed in Figure 1.

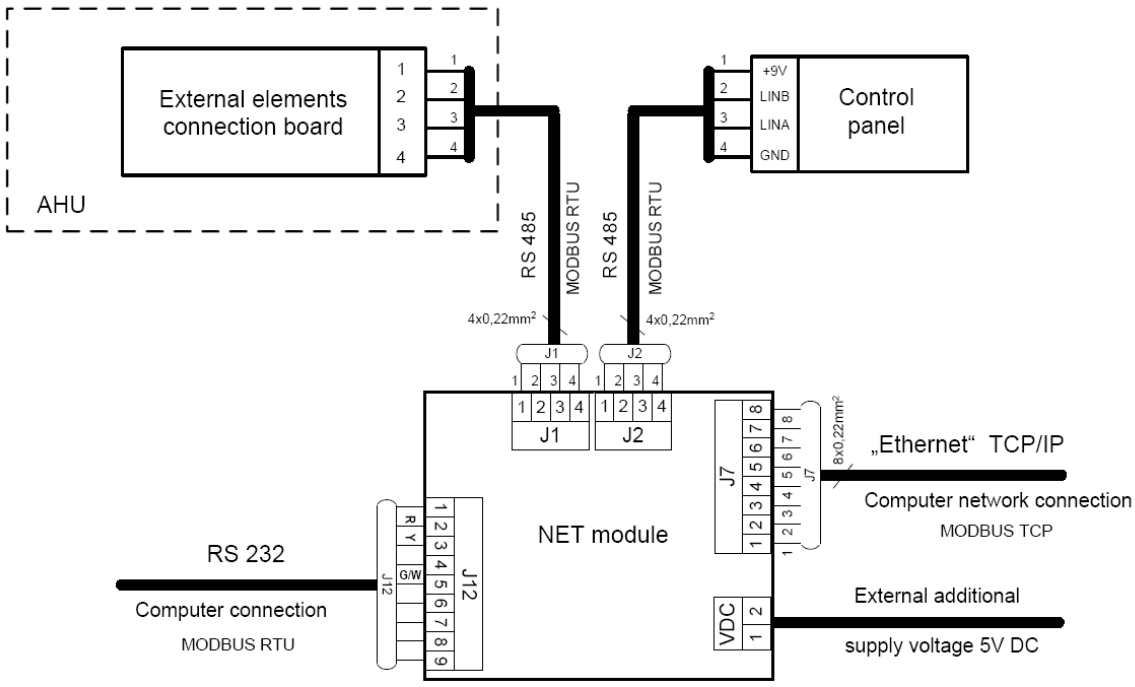

Fig. 1.

MODBUS CONNECTION PARAMETERS

To read data from controller must be provided serial or TCP/IP connection. Connection parameters are fixed, detailed information in Figure 2.

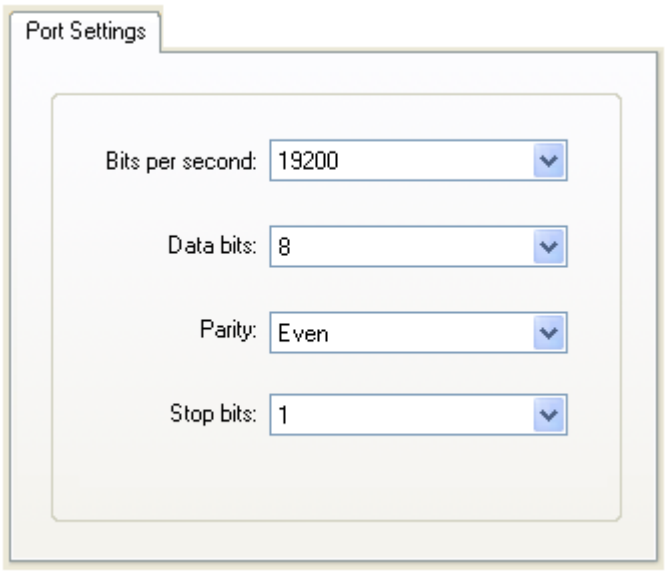

Fig. 2

If distance between AHUs and BMS computer is more than 10 meters, for serial connection the ground wire is required (not two but three wires: A, B, GND).

When the distance between AHUs and BMS is very long, to ensure good connection line compensation resistances are recommended.

MODBUS DATA REGISTERS

To read data (information about AHU control: operation status, temperatures, fans speed and etc.) from registers of controller is using function code 03. To set registers (turn on/off unit, set values) is using function code 06 or 16.

Each controller board have self identification address. If only one unit is connected to the BMS, common identification address 254 can be used. In case if few units are connected (max. 20 units), each controller board must have different identification address (prepared before). To read data from any of those controllers, address of this controller must be used (1, 2, 3 and etc.). Main data registers of C1 controller are described in Table 1.

C3 controller registers are shown in Table 2.

Table 1. **C1 controller** MODBUS registers and description

Registers	Access	Type	Description
1	Read/Write	Integer	Year [yyyy]
2	Read/Write	Integer	Date [mm,dd]
3	Read/Write	Integer	Time [hh,mm]
4	Read/Write	Integer	Time&Day [ss,wd]
5	Read Only	Integer	Supply Air Temperature, ºC [T*100]
6	Read Only	Integer	Room Air Temperature, ºC [T*100]
7	Read Only	Integer	Outdoor Air Temperature, ºC [T*100]
8	Read Only	Integer	Plate Heat Exchanger Temperature, ºC [T*100]
9	Read Only	Integer	Return Water Temperature, V [U*100] Calculating Temperature according: T = 21.4 * [value, V] – 23.216
11	Read Only	Integer	Heat Exchanger Control Output, V [U*100]
12	Read Only	Integer	Water Heater Control Output, V [U*100]
13	Read Only	Integer	Water Cooler Control Output, V [U*100]
14	Read Only	Integer	Fans Control Output, V [U*100]
15	Read Only	Integer	Electric Heater Output Step 1, % [Proc*10]
16	Read Only	Integer	Electric Heater Output Step 2, % [Proc*10]
17	Read Only	Integer	Electric Heater Output Step 3, % [Proc*10]
18	Read Only	Integer*	8 Digital Inputs [XXXXXXXX byte code] 0-Disabled, 1-Enabled), ex., 00010001 – 1 and 5 DI are Enabled DIN1 – Supply air fan overheating DIN2 – Exhaust air fan overheating DIN3 – Electric heater overheating DIN4 – Rotor rotating signal DIN5 – Stop signal DIN6 – Change supply air filter DIN7 – Change exhaust air filter DIN8 – Fire alarm
19	Read Only	Integer*	7 Digital Outputs [XXXXXXXX byte code] 0-Disabled, 1-Enabled) DO1 – 1 speed (if 3-speed fans) DO2 – 2 speed (if 3-speed fans) DO3 – 3 speed (if 3-speed fans) DO4 – Air damper actuator or Rotor control (if 3-speed fans) DO5 (SIM1) – Electric heater 1 step DO6 (SIM2) – Electric heater 2 step DO7 (SIM3) – Electric heater 3 step
20	Read Only	Integer	Current Fan Intensity (0,1,2,3)
21	Read/Write	Integer	Control Mode (0-Manual, 1-Auto)
22	Read Only	Integer	Current Supply Set Point, ºC [T*100]
23	Read Only	Integer	Room Set Point, ºC [T*100]

* - hexadecimal value, must be changed in binary code.

Table 1 continuation. **C1 controller** MODBUS registers and description

Registers	Access	Type	Description
24	Read Only	Integer	Unit Stop Code: Value= 1 - Supply air fan overheating Value= 2 - Exhaust air fan overheating Value= 3 - Electric heater overheating Value= 4 - Rotor stopping Value= 8 - Fire alarm Value= 9 - Supply temperature sensor error Value= 10 - Exhaust temperature sensor error Value= 11 - Outside temperature sensor error Value= 12 - Plate heat exchanger temperature sensor error Value= 17 - Return water low temperature Value= 18 - Plate heat exchanger frost possibility Value= 19 - Supply air low temperature Value= 20 - Supply air overheating
27	Read/Write	Integer	Start / Stop (0-STOP, 1-START)
30	Read/Write	Integer	Supply Set Point, ºC [T*100]
43	Read/Write	Integer	Fan Intensity (0,1,2,3)
53	Read/Write	Integer	Room Air SP, ºC [T*100]
56	Read/Write	Integer	Regulation Mode (0- Supply Air Temperature Maintenance Mode, 1- Room Temperature Maintenance Mode)

Table 2. **C3 controller** MODBUS registers and description

Registers	Access	Type	Description
129,130	Read Only	Swapped Floating Point	Outdoor Air Temperature, ºC
131,132	Read Only	Swapped Floating Point	Room Air Temperature, ºC
133,134	Read Only	Swapped Floating Point	Supply Air Temperature, ºC
137,138	Read Only	Swapped Floating Point	Anti-freezing Temperature, ºC
139,140	Read Only	Swapped Floating Point	Return Water Temperature, V *Calculating temperature according:* *T = 21.4 * [value, V] – 23.216*
141,142	Read Only	Swapped Floating Point	Supply Pressure, Pa
143,144	Read Only	Swapped Floating Point	Exhaust Pressure, Pa
145,146	Read Only	Swapped Floating Point	Supply Fan Control Output, V
147,148	Read Only	Swapped Floating Point	Exhaust Fan Control Output, V
149,150	Read Only	Swapped Floating Point	Supply Air Flow, m³/h
151,152	Read Only	Swapped Floating Point	Exhaust Air Flow, m³/h
153,154	Read Only	Swapped Floating Point	Rotor Control Output, V
155,156	Read Only	Swapped Floating Point	Water Heater Control Output, V
157,158	Read Only	Swapped Floating Point	Electric Heater Output Power, %
159,160	Read Only	Swapped Floating Point	Water Cooler Control Output, V

Table 2 continuation. **C3 controller** MODBUS registers and description

Registers	Access	Type	Description
161,162	Read Only	Swapped Floating Point	Electric Cooler Output Power, %
163	Read Only	Integer	AHU Current Operating Status (0-OFF, 1-ON)
164,165	Read Only	Swapped Floating Point	Air Quality Input (0...10), V
166,167	Read Only	Swapped Floating Point	Supply Pressure Input (0...10), V
168,169	Read Only	Swapped Floating Point	Exhaust Pressure Input (0...10), V
170	Read Only	Integer	AHU Set Operating Status (0-OFF, 1-ON) *Ex., Unit is turned on from the panel but not working because time schedule is not set. By reading data from registers you will become: 163 → 0 and 170 → 1.*
171	Read Only	Integer	Set Fan Intensity (1,2,3) (same as in 1050)
172,173	Read Only	Swapped Floating Point	Temperature Set Point, ºC
174	Read Only	Integer	Control Mode (0-Manual, 1-Auto)
175	Read Only	Integer	Regulation Mode (0- Supply Air Temperature Maintenance Mode, 1- Room Temperature Maintenance Mode)
177	Read Only	Integer	Current Fan Intensity (0,1,2,3)
178,179	Read Only	Swapped Floating Point	Current Supply Air Set Point, ºC
180,181	Read Only	Swapped Floating Point	Room Set Point, ºC
297	Read Only	Integer*	8 Digital Inputs on lower byte 00FF [XXXXXXXX low byte code] 0-Disabled, 1-Enabled), ex., 00010001 – 1 and 5 DI are Enabled DIN1 – Supply air fan overheating DIN2 – Exhaust air fan overheating DIN3 – Rotor rotating signal DIN4 – Electric heater overheating DIN5 – Remote Start/Stop DIN6 – Fire alarm DIN7 – Change supply air filter DIN8 – Change exhaust air filter

* - hexadecimal value, must be changed in binary code.

Table 2 continuation. **C3 controller** MODBUS registers and description

Registers	Access	Type	Description
298	Read Only	Integer*	8 Digital Outputs [XXXXXXXX byte code] 0-Disabled, 1-Enabled) DO1 – Water circulation pump DO2 – Air damper actuator DO3 – Common alarm signal DO4 – DX cooling second step DO5 – Heat exchanger On/Off signal DO6 – DX cooling first step or 1 speed of fans (if 3 speed fan control) DO7 – not used or 2 speed of fans (if 3 speed fan control) DO8 – not used or 3 speed of fans (if 3 speed fan control)
313	Read Only	Integer	Unit Stop Code: Value=1 - Supply air fan overheating Value=2 - Exhaust air fan overheating Value=3 - Rotor stopping Value=4 - Electric heater overheating Value=6 - Fire alarm Value=9 - Supply temperature sensor error Value=10 - Exhaust temperature sensor error Value=11 - Outside temperature sensor error Value=12 - Plate heat exchanger temp.sensor error Value=19 - Supply air low temperature Value=20 - Supply air overheating Value=27 - Return water low temperature Value=28 - Plate heat exchanger frost possibility
315	Read/Write	Integer	Start / Stop (0-STOP, 1-START)
513	Read/Write	Integer	Supply Air SP * 100 (1000...3000)
533	Read/Write	Integer	Control Mode (0-Manual, 1-Auto)
771	Read/Write	Integer	Room Air SP * 100 (1000...3000)
1050	Read/Write	Integer	Set Fan Intensity (1,2,3)

* - hexadecimal value, must be changed in binary code.

SHORT DESCRIPTION ABOUT REGISTERS TYPES

There are two types of data registers provided: Integer and Floating Point.

- Integer type is intended for data with whole numbers and using to read and write discrete signals like fan intensity, set point, inputs and outputs. To transfer integer decimal 16 digits data is needed 2 bytes (2x8). Example, to transfer decimal number 12345 (hexadecimal 3039) is needed two bytes or one MODBUS register.
- Floating Point type is intended for transfer numbers with fraction. In this case data will transfer in two registers (one part of data in one register, second part in another). Example, to transfer decimal float number 125,555 (hexadecimal 42FB1C29) is needed four bytes or two MODBUS registers. Number 42FB will transfer from first register, 1C29 number from second.